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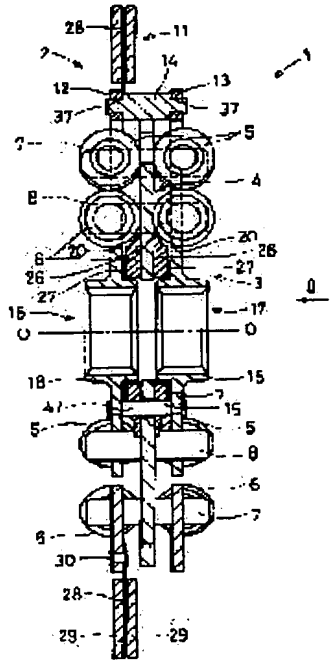
(54) DAMPER MECHANISM

(57)Abstract:
PROBLEM TO BE SOLVED: To provide sufficient torque capacity in limited space in damper mechanism with springs arranged in series.
SOLUTION: A clutch disc assembly 1 is provided with an input member 2, an intermediate member 4, an output member 3, a pair of first springs 5 and a pair of second springs 6. A pair of first, springs 5 are arranged in the axial direction so as to be compressed circumferentially in parallel between the input member 2 and the intermediate member 4 when both members 2, 4 are relatively rotated. A pair of second springs 6 are arranged in the axial direction so as to be compressed circumferentially in parallel between the intermediate member 4 and the output member 3 when both members 4, 3 are relatively rotated. A pair of second springs 6 are arranged in radially different positions from a pair of first springs 5.



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* NOTICES *

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CLAIMS

[Claim(s)]
[Claim 1] The 1st body of revolution (2,102) and the 2nd body of revolution arranged near said 1st body of revolution (2,102) (4,104), The 3rd body of revolution arranged near said 2nd body of revolution (4,104) (3,103), One pair of 1st elastic members which have been arranged together with shaft orientations, and have been arranged so that it may be compressed into a circumferencial direction by juxtaposition among both body of revolution, if said 1st body of revolution (2,102) and said 2nd body of revolution (4,104) carry out relative rotation (5,105), Are arranged together with shaft orientations, and it is arranged so that it may be compressed into a circumferencial direction by juxtaposition among both body of revolution, if said 2nd body of revolution (4,104) and said 3rd body of revolution (3,103) carry out relative rotation. The damper device equipped with one pair of 2nd elastic members (6,106) arranged in the location where radial differs to said one pair of 1st elastic members (5,105) (1,101).
[Claim 2] One pair of 1st sheets which are arranged to the circumferencial direction both ends of one pair of said 1st elastic members (5,105), and engage with said 1st body of revolution (2,102) and said 2nd body of revolution (4,104) (7,107), The damper device according to claim 1 which has been arranged to the circumferencial direction both ends of one pair of said 2nd elastic members (6,106), and is further equipped with one pair of 2nd sheets (8,108) which engage with said 2nd body of revolution (4,104) and said 3rd body of revolution (4,104) (1,101).
[Claim 3] Said one pair of 1st sheets (7,107) are the damper devices (1,101) according to claim 2 in which have the 1st stop section (61) which can engage with shaft orientations at migration impossible to said 1st body of revolution (2,102), and said one pair of 2nd sheets (8,108) have the 2nd stop section (53) which can engage with migration impossible in shaft orientations to said 3rd body of revolution (3,103).
[Claim 4] said one pair of 1st sheets (7,107) -- said 1st body of revolution (2,102) and said 2nd body of revolution (4,104) -- radial -- migration impossible -- and a circumferencial direction -- balking -- possible -- being engaged -- **** -- said one pair of 2nd sheets (8,108) -- said 2nd body of revolution (4,104) and said 3rd body of revolution (3,103) -- radial -- migration impossible -- and the damper device (1,101) according to claim 2 or 3 which is engaging with the circumferencial direction possible [balking].
[Claim 5] every -- the 1st engagement section (62) to which the 1st sheet (7,107) engages with one pair of 1st elastic members (5,105) -- having -- every -- the damper device (1) according to claim 1 to 4 in which it has the 2nd engagement section (54) to which the 2nd sheet (8,108) engages with one pair of 2nd elastic members (6,106).
[Claim 6] The disc-like member in which the 2nd window hole (49,149) which extends in the circumferencial direction formed in the location where the 1st window hole (48,148) which extends in a circumferencial direction differs from said 1st window hole (48,148) in radial was formed (4,104), One pair of 1st elastic members arranged at the shaft-orientations both sides of said 1st window hole (48,148) (5,105), One pair of 1st sheets with which the circumferencial direction both-sides edge of said 1st window hole (48,148) is penetrated, it extends in shaft orientations, and shaft-orientations both ends contact the circumferencial direction edge of one pair of said 1st elastic

members (5,105) (7,107), The 1st rotation member which engages with a circumferencial direction to said one pair of 1st sheets (7,107) (2), One pair of 2nd elastic members arranged at the shaft-orientati ons both sides of said 2nd window hole (49,149) (6,106), One pair of 2nd sheets with which the circumferencial direction both-sides edge of said 2nd window hole (49,149) is penetrated, it extends in shaft orientations, and shaft-orientations both ends contact the circumferencial direction edge of one pair of said 2nd elastic members (6,106) (8,108), The damper device equipped with the 2nd rotation member (3,103) which engages with a circumferencial direction to said one pair of 2nd sheets (1,101).

[Claim 7] Said 1st rotation members (2) are one pair of 1st plates (12 13) which have been arranged at the shaft-orientations both sides of said disc-like member, and were fixed by the 1st connection section (14). Each 1st plate (12 13) of the above has the 1st supporter (32) which engages with the circumferencial direction both ends of said 1st sheet (7). Said 2nd rotation members (3) are one pair of 2nd plates (20) which have been arranged at the shaft-orientations both sides of said disc-like member (4), and were fixed by the 2nd connection section (15). Each 2nd plate (20) of the above is the damper device according to claim 6 in which it has the 2nd supporter (21) which engages with the circumferencial direction both ends of said 2nd sheet (8) (1).

[Claim 8] It is the annular plate arranged by said one pair of 1st plates (12 13) and said one pair of 2nd plates (20) corresponding to shaft orientations mutually. For said 1st supporter (32), said 2nd supporter (21) is a damper device according to claim 7 which is the configuration projected [in / are the configuration projected to said 2nd plate (20) side in radial, and / radial] to said 1st plate (12 13) side (1).

[Claim 9] Said one pair of 1st sheets (7) have the 1st body (60) with which each is prolonged in shaft orientations. Said 1st body (60) penetrates the circumferencial direction both ends of the 1st window hole (48), and shaft-orientations both sides are engaging with the circumferencial direction edge of one pair of said 1st elastic members (5). Said one pair of 2nd sheets (8) have the 2nd body (52) with which each is prolonged in shaft orientations. Said 2nd body (52) is the damper device according to claim 7 or 8 in which penetrate the circumferencial direction both ends of the 2nd window hole (49), and shaft-orientations both ends are engaging with the circumferencial direction both ends of one pair of said 2nd elastic members (6) (1).

[Claim 10] It has one pair of 1st engagement sections (62) which said 1st sheet (7) is prolonged from said 1st body (60), and engage with the circumferencial direction edge of one pair of said 1st elastic members (5), respectively. Said 2nd sheet (8) is the damper device according to claim 9 in which it has one pair of 2nd engagement sections (54) which are prolonged from said 2nd body (52) and engage with the circumferencial direction edge of one pair of said 2nd elastic members (6), respectively (1).

[Claim 11] Said 1st body (60) is the damper device according to claim 9 or 10 in which are engaging with said 1st window hole (48) and the circumferencial direction both ends of the 1st supporter (32) possible [balking to a circumferencial direction] impossible [migration to radial], and said 2nd body (52) is engaging with said 2nd window hole (49) and the circumferencial direction both ends of the 2nd supporter (21) possible [balking to a circumferencial direction] impossible [migration to radial].

[Claim 12] It has the 1st stop section (61) which said 1st sheet (7) is prolonged in the opposite side said 1st elastic member (5) side in a circumferencial direction from the shaft-orientations pars intermedia of said 1st body (60), and is inserted into shaft orientations among said one pair of 1st plates (12 13). Have the 2nd stop section (53) which said 2nd sheet (8) is prolonged in the opposite side said 2nd elastic member (6) side in a circumferencial direction from the shaft-orientations pars intermedia of said 2nd body (52), and is inserted into shaft orientations among said one pair of 2nd plates (20). A damper device according to claim 9 to 11 (1).

[Claim 13] Said disc-like member (4) has the 2nd contact section (47) which can contact the 1st contact section (50) which can contact said 1st connection section (14), and said 2nd connection section (15). The circumferencial direction include angle between said 1st contact sections (50) and said 1st connection sections (14) It has different magnitude from the circumferencial direction

include angle between said 2nd contact sections (47) and said 2nd connection sections. Therefore, when the torsion include angle of said 1st rotation member (2) and said 2nd rotation member (3) is enlarged, one compression of said one pair of 1st elastic members (5) and one pair of said 2nd elastic members (6) can stop beyond another side. A damper device according to claim 6 to 12 (1).
[Claim 14] Said 1st window hole (48) is the damper device according to claim 6 to 12 in which separate only the 1st torsion include angle from said one pair of 1st sheets (7) to a circumferencial direction, and it has the 1st contact side (74) which can contact (1).
[Claim 15] Said 2nd window hole (49) Damper device according to claim 14 in which separate only the 2nd torsion include angle from said 2nd sheet (8) of the 1st pair to a circumferencial direction, and it has the 2nd contact side (71) which can contact (1)
[Claim 16] Said 1st torsion include angle and said 2nd torsion include angle are the damper device according to claim 15 which one compression of said one pair of 1st elastic members (5) and one pair of said 2nd elastic members (6) can stop before compression of another side when magnitude differs, therefore the torsion include angle of said 1st rotation member (2) and said 2nd rotation member (3) is enlarged (1).
[Claim 17] When whenever [angular strain / of said 1st rotation member (2) and said 2nd rotation member (3)] becomes large, either said one pair of 1st elastic members (5) or said one pair of 2nd elastic members (6) are the damper device according to claim 6 to 12 stuck beyond another side (1).
[Claim 18] Said 1st rotation member (102) and said 2nd rotation member (120) are arranged together with radial. Said disc-like members (104) are one pair of plates (112,113) which have been arranged at the shaft-orientations both sides of said 1st rotation member (102) and said 2nd rotation member (120), and were fixed by the connection section (115). Said 1st window hole (148) and said 2nd window hole (149) are formed in said one pair of plates (112,113). Said one pair of 1st elastic members (105) and said one pair of 1st sheets [some of] (107) are arranged in said 1st window hole (148). Said 2nd window hole (149) ****** having been arranged with said 2nd elastic member (106) of the 1st pair, and said one pair of 2nd sheets [some of] (108). Said 1st rotation member (102) has the 1st supporter (132) which engages with the circumferencial direction both ends of said 1st sheet (107). Said 2nd rotation member (120) is the damper device (101) according to claim 6 in which it has the 2nd supporter (121) which engages with the circumferencial direction both ends of said 2nd sheet (108).
[Claim 19] Said 1st window hole (148) and said 2nd window hole (149) are a damper device (101) according to claim 18 which is arranged together with radial and formed continuously mutually.
[Claim 20] Said one pair of 1st sheets (107) have the 1st body (60) with which each is prolonged in shaft orientations. Said 1st body (60) penetrates the circumferencial direction both ends of the 1st window hole (148), and shaft-orientations both sides are engaging with the circumferencial direction edge of one pair of said 1st elastic members (105). Said one pair of 2nd sheets (108) have the 2nd body (52) with which each is prolonged in shaft orientations. Said 2nd body (52) is the damper device (101) according to claim 18 or 19 in which penetrate the circumferencial direction both ends of the 2nd window hole (149), and shaft-orientations both ends are engaging with the circumferencial direction both ends of one pair of said 2nd elastic members (106).
[Claim 21] It has one pair of 1st engagement sections (62) which said 1st sheet (107) is prolonged from said 1st body (60), and engage with the circumferencial direction edge of one pair of said 1st elastic members (105), respectively. Said 2nd sheet (108) is the damper device (101) according to claim 20 in which it has one pair of 2nd engagement sections (54) which are prolonged from said 2nd body (52) and engage with the circumferencial direction edge of one pair of said 2nd elastic members (106), respectively.
[Claim 22] said 1st body (60) -- said 1st window hole (148) and the circumferencial direction both ends of the 1st supporter (132) -- radial -- migration impossible -- and a circumferencial direction -- balking -- possible -- being engaged -- **** -- said 2nd body (52) -- said 2nd window hole (149) and the circumferencial direction both ends of the 2nd supporter (121) -- radial -- migration impossible -- and the damper device (101) according to claim 20 or 21 which is engaging with the circumferencial direction possible [balking].

[Claim 23] It has the 1st stop section (61) which said 1st sheet (107) is prolonged in the opposite side said 1st elastic member (105) side in a circumferencial direction from the shaft-orientations pars intermedia of said 1st body (60), and is inserted among said one pair of plates (112,113). Have the 2nd stop section (53) which said 2nd sheet (108) is prolonged in the opposite side said 2nd elastic member (106) side in a circumferencial direction from the shaft-orientations pars intermedia of said 2nd body (52), and is inserted among said one pair of plates (112,113). A damper device according to claim 20 to 22 (101).
[Claim 24] The 1st rotation plate which has the 1st window part, and one pair of 2nd rotation plates which each other are fixed to the shaft-orientations both sides of said 1st window part, are arranged, and have the 2nd window part corresponding to said 1st window part, One pair of coil springs which have been arranged at the shaft-orientations both sides of said 1st window part of said 1st rotation plate, and have been arranged in said 2nd window part, The damper device equipped with one pair of sheets which has the body with which the circumferencial direction both ends of said 1st window part are penetrated, it extends in shaft orientations, and each shaft-orientations both ends engage with said one pair of coil springs.
[Claim 25] Said sheet is the damper device according to claim 24 in which it has one pair of insertion sections which are prolonged from said body and prolonged in said one pair of coil springs.
[Claim 26] Said body is a damper device according to claim 24 or 25 which is engaging with the circumferencial direction both ends of said 1st window part and the 2nd window part possible [balking to a circumferencial direction] impossible [migration to radial].
[Claim 27] It is the damper device according to claim 24 to 26 in which the crevice is formed in the radial pars intermedia of the circumferencial direction both ends of the 2nd window part, said body of said sheet has been arranged in said crevice, and said one pair of coil springs are in contact with the radial both sides of said circumferencial direction both ends.
[Claim 28] Said sheet is the damper device according to claim 24 to 27 in which it has the lobe which is prolonged in the opposite side said elastic member side in a circumferencial direction from the shaft-orientations pars intermedia of said body, and is inserted among said one pair of 2nd rotation plates.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[Field of the Invention] This invention relates to a damper device and the damper device for twisting, while transmitting torque especially, and decreasing and absorbing vibration.
[0002]
[Description of the Prior Art] A damper device is equipment for absorbing and decreasing torsion vibration included in torque while it is used for a transmission and transmits torque. An absorber device is included in a clutch-disc assembly, a flywheel assembly, etc. which are used for the clutch of an automobile. The damper device mainly consists of elastic members, such as a spring arranged between the 1st rotation member, the 2nd rotation member, and the 1st rotation member and the 2nd rotation member. An elastic member is arranged in the window part of the 1st rotation member and the 2nd rotation member, and in case the 1st rotation member and the 2nd rotation member carry out relative rotation, it is compressed among both members.
[0003] The clutch-disc assembly consists of springs (torsion spring) which connect elastically with a circumferencial direction one pair of disc-like members mainly fixed to the clutch disc which has friction facing, and the clutch disc, the output side hub which has the flange arranged between disc-like members, and a flange and one pair of disc-like members. Here, the damper device consists of the flanges and springs of one pair of disc-like members, and a hub.
[0004] drive-system [the time of neutrality]-mainly ******** at the time of transmission ******** and transit as an allophone problem of a vehicle that a cure is required from a clutch-disc assembly -- and it is filled and there is a sound. In order to solve the latter allophone problem, it is necessary to lower the torsal rigidity of an acceleration-and-deceleration torque region as much as possible, and to set up drive-system torsion resonance frequency lower than an engine practical use rotation region.
[0005] Then, while twisting by arranging two springs to a serial at a circumferencial direction and making an include angle large conventionally, the fall of torsal rigidity is aimed at. Two torsion springs arranged in the location where two springs are arranged on a concentric circle, or radial differs as a configuration method of a spring are connected with the serial through pars intermedia material.
[0006]
[Problem(s) to be Solved by the Invention] In the clutch-disc assembly which carried out serial arrangement of the two conventional springs, to arrange to high density in the tooth space to which the spring was restricted is desired. Moreover, since the tooth space is restricted, there is also a problem that torque capacity cannot be enlarged enough. The purpose of this invention is to obtain torque capacity sufficient in the tooth space restricted in the damper device in which it has the spring arranged at the serial.
[0007]
[Means for Solving the Problem] The damper device according to claim 1 is equipped with the 1st body of revolution, the 2nd body of revolution, the 3rd body of revolution, one pair of 1st elastic members, and one pair of 2nd elastic members. The 2nd body of revolution is arranged near the 1st body of revolution. The 3rd body of revolution is arranged near the 2nd body of revolution. One pair

of 1st elastic members are arranged together with shaft orientations, and if the 1st body of revolution and the 2nd body of revolution carry out relative rotation, they are arranged so that it may be compressed into a circumferencial direction by juxtaposition among both body of revolution. One pair of 2nd elastic members are arranged together with shaft orientations, if the 2nd body of revolution and the 3rd body of revolution carry out relative rotation, they will be arranged so that it may be compressed into a circumferencial direction by juxtaposition among both body of revolution, and they are arranged in the location where radial differs to one pair of 1st elastic members.

[0008] By this damper device, one pair of 2nd elastic members arranged at juxtaposition in one pair of 1st elastic members and torque transmission which have been arranged in torque transmission at juxtaposition are arranged between the 1st body of revolution and the 3rd body of revolution through the 2nd body of revolution at the serial in between. A big torque capacity is obtained with a large torsion include angle according to this structure. The damper device according to claim 2 is further equipped with one pair of 1st sheets, and one pair of 2nd sheets. One pair of 1st sheets are arranged at the circumferencial direction both sides of one pair of 1st elastic members, and engage with the 1st body of revolution and the 2nd body of revolution. One pair of 2nd sheets are arranged to the circumferencial direction both ends of one pair of 2nd elastic members, and engage with the 2nd body of revolution and the 3rd body of revolution.

[0009] By this damper device, one pair of 1st sheets are arranged at the circumferencial direction edge of both 1st elastic members [one pair of] arranged together with shaft orientations. Moreover, one pair of 2nd sheets are arranged to the circumferencial direction both ends of one pair of 2nd elastic members arranged together with shaft orientations. Thus, since the circumferencial direction both ends of the elastic member arranged together with shaft orientations with each sheet are supported, in each circumferencial direction edge, one sheet can perform torque transmission of two elastic members.

[0010] As for one pair of 1st sheets, a damper device according to claim 3 has the 1st engagement section which can engage with shaft orientations at migration impossible to the 1st body of revolution in claim 2, and one pair of 2nd sheets have the 2nd engagement section which can engage with migration impossible in shaft orientations to the 3rd body of revolution. By this damper device, one pair of 1st sheets are unmovable to shaft orientations to the 1st rotation, and one pair of 2nd sheets are unmovable to shaft orientations to the 3rd body of revolution. Consequently, one pair of 1st sheets and the 2nd sheet swerve from the 1st body of revolution and the 3rd body of revolution, and it is hard to separate from them in ******** surely.

[0011] By the damper device according to claim 4, in claims 2 or 3, one pair of 1st sheets are engaging with the 1st body of revolution and the 2nd body of revolution possible [balking to a circumferencial direction] impossible [migration to radial], and one pair of 2nd sheets are engaging with the 2nd body of revolution and the 3rd body of revolution possible [balking to a circumferencial direction] impossible [migration to radial]. By this damper device, migration to the method of the outside of radial is restricted by one pair of 1st sheets with which one pair of 1st elastic members engaged with the 1st body of revolution and the 2nd body of revolution. Moreover, migration to the method of the outside of radial is restricted by one pair of 2nd sheets with which one pair of 2nd elastic members engaged with the 2nd body of revolution and the 3rd body of revolution.

[0012] A damper device according to claim 5 has the 1st engagement section to which each 1st sheet engages with one pair of 1st elastic members in either of claims 1-4, and each 2nd sheet has the 2nd engagement section which engages with one pair of 2nd elastic members. By this damper device, it is hard to separate from one pair of 1st elastic members, and one pair of 2nd elastic members from the 1st sheet and the 2nd sheet, respectively. Therefore, with the structure where the 1st sheet and the 2nd sheet are engaging with body of revolution etc., one pair of elastic members and one pair of 2nd elastic members cannot secede from body of revolution easily.

[0013] The damper device according to claim 6 is equipped with a disc-like member, one pair of 1st elastic members, one pair of 1st sheets, the 1st rotation member, one pair of 2nd elastic members, one pair of 2nd sheets, and the 2nd rotation member. The 2nd window hole which extends in the circumferencial direction formed in the location where the 1st window hole where a disc-like

member is prolonged in a circumferencial direction differs from the 1st window hole in radial is formed. One pair of 1st elastic members are arranged at the shaft-orientations both sides of the 1st window hole. One pair of 1st sheets penetrated the circumferencial direction both-sides edge of the 1st window hole, and were prolonged in shaft orientations, and shaft-orientations both ends are in contact with the circumferencial direction both ends of one pair of 1st elastic members. The 1st rotation member engages with a circumferencial direction to one pair of 1st sheets. One pair of 2nd elastic members are arranged at the shaft-orientations both sides of the 2nd window hole. One pair of 2nd sheets penetrate the circumferencial direction both-sides edge of the 2nd window hole, and are prolonged in shaft orientations, and shaft-orientations both ends contact the circumferencial direction edge of one pair of 2nd elastic members. The 2nd rotation member engages with a circumferencial direction to one pair of 2nd sheets.

[0014] By this damper device, one pair of 1st elastic members are arranged so that it may act on juxtaposition in torque transmission, and one pair of 2nd elastic members are arranged so that it may act on juxtaposition in torque transmission. Furthermore, one pair of 1st elastic members and one pair of 2nd elastic members are arranged so that it may act on a serial through a disc-like member in between. According to this structure, torque capacity can be enlarged enough, taking a large torsion include angle. Moreover, by this damper device, each of one pair of 1st elastic members approaches shaft orientations most, and is arranged, and each receives mutually, and one pair of 2nd elastic members approach shaft orientations most, and are arranged. Furthermore, one pair of 1st elastic members and one pair of 2nd elastic members approach radial, and are arranged. For this reason, a spring can be arranged to high density in the limited tooth space. Consequently, a highly efficient damper device is realizable.

[0015] By the damper device according to claim 7, in claim 6, the 1st rotation members are one pair of 1st plates which have been arranged at the shaft-orientations both sides of a disc-like member, and were fixed by the 1st connection section, and the 1st plate has the 1st supporter which engages with the circumferencial direction both ends of the 1st sheet. The 2nd rotation members are one pair of 2nd plates which have been arranged at the shaft-orientations both sides of a disc-like member, and were fixed by the 2nd connection section, and each 2nd plate has the 2nd supporter which engages with the circumferencial direction both ends of the 2nd sheet.

[0016] A damper device according to claim 8 is the annular plate with which one pair of 1st plates and one pair of 2nd plates were arranged in radial by shaft orientations in the same location in claim 7, the 1st supporter is the configuration projected to the 2nd plate side in radial, and the 2nd supporter is the configuration projected to the 1st plate side in radial. By this damper device, one pair of 1st elastic members are arranged between the 1st supporter of the 1st plate, and one pair of 2nd elastic members are arranged between the 2nd supporter of the 2nd plate. Consequently, the 1st elastic member and the 2nd elastic member approach radial, and are arranged, and other members etc. are not arranged among both. Thus, by arranging densely one pair of 1st elastic members, and the 2nd elastic member, high-density spring arrangement is realizable in the limited tooth space.

[0017] By the damper device according to claim 9, in claims 7 or 8, one pair of 1st sheets have the 1st body with which each is prolonged in shaft orientations, the 1st body penetrates the circumferencial direction both ends of the 1st window hole, and shaft-orientations both sides are engaging with the circumferencial direction edge of one pair of 1st elastic members. One pair of 2nd sheets have the 2nd body with which each is prolonged in shaft orientations, the 2nd body penetrates the circumferencial direction both ends of the 2nd window hole, and shaft-orientations both ends are engaging with the circumferencial direction both ends of one pair of 2nd elastic members.

[0018] By the damper device according to claim 10, in claim 9, it has one pair of 1st engagement sections which the 1st sheet is prolonged from the 1st body and engage with the circumferencial direction edge of one pair of 1st elastic members, respectively, and the 2nd sheet has one pair of 2nd engagement sections which are prolonged from the 2nd body and engage with the circumferencial direction edge of one pair of 2nd elastic members, respectively. By this damper device, the 1st sheet has one pair of 1st engagement sections which engage with the circumferencial direction edge of one pair of 1st elastic members, respectively. Moreover, the 2nd sheet has one pair of 2nd engagement

sections which engage with the circumferencial direction edge of one pair of 2nd elastic members, respectively. This has stopped easily being able to separate each elastic member from each sheet.
[0019] By the damper device according to claim 11, in claims 9 or 10, the 1st body is engaging with the 1st window hole and the circumferencial direction both ends of the 1st supporter possible [balking to a circumferencial direction] impossible [migration to radial], and the 2nd body is engaging with the 2nd window hole and the circumferencial direction both ends of the 2nd supporter possible [balking to a circumferencial direction] impossible [migration to radial]. By this damper device, the 1st sheet is unmovable to radial to the 1st supporter, and the 2nd sheet serves as migration impossible radial at the 2nd supporter. For this reason, it is hard to move each elastic member which engaged with each sheet to the method of the outside of radial from the 1st plate and the 2nd plate, respectively.
[0020] By the damper device according to claim 12, the 1st sheet has the 1st stop section which is prolonged in the opposite side the 1st elastic member side in a circumferencial direction from the shaft-orientations pars intermedia of the 1st body, and is inserted among one pair of 1st plates in either of claims 9-11. The 2nd sheet has the 2nd stop section which is prolonged in the opposite side the 2nd elastic member side in a circumferencial direction from the shaft-orientations pars intermedia of the 2nd body, and is inserted into shaft orientations among one pair of 2nd plates.
[0021] By this damper device, when the 1st sheet has migration restricted to shaft orientations to one pair of 1st plates, as for the 1st elastic member, migration is restricted to shaft orientations. Moreover, the 2nd elastic member is having migration restricted from one pair of 2nd plates to shaft orientations through the 2nd sheet. Consequently, the member which supports the shaft-orientations outside of the 1st and 2nd elastic members becomes unnecessary, and structure simplifies.
[0022] By the damper device according to claim 13, it sets to either of claims 6-12. A disc-like member has the 2nd contact section which can contact the 1st contact section which can contact the 1st connection section, and the 2nd connection section. The circumferencial direction include angle of the 1st contact section and the 1st connection section has different magnitude from the circumferencial direction include angle between the 2nd contact section and the 2nd connection section. Therefore, when the torsion include angle of the 1st rotation member and the 2nd rotation member is enlarged, one compression of one pair of 1st elastic members and one pair of 2nd elastic members can stop beyond another side.
[0023] By this damper device, since one compression of one pair of 1st elastic members and one pair of 2nd elastic members stops beyond another side, two steps of properties are acquired. That is, in the range where a torsion include angle is small, since the 1st elastic member and the 2nd elastic member are compressed into a serial, the property of low rigidity is acquired, after one of compression is suspended, only another side is compressed and the property of high rigidity is acquired.
[0024] By the damper device according to claim 14, in either of claims 6-12, the 1st window hole separates only the 1st torsion include angle from one pair of 1st sheets to a circumferencial direction, and has the 1st contact side which can contact. By the damper device according to claim 15, the 2nd window hole has the 2nd contact side which separated only the 2nd torsion include angle from one pair of 2nd sheets to the circumferencial direction and which can be contacted in claim 14.
[0025] By the damper device according to claim 16, in claim 15, when magnitude differs, therefore the torsion include angle of the 1st rotation member and the 2nd rotation member is enlarged, one compression of one pair of 1st elastic members and one pair of 2nd elastic members can stop the 1st torsion include angle and the 2nd torsion include angle before compression of another side. By the damper device according to claim 17, in either of claims 6-12, if whenever [angular strain / of the 1st rotation member and the 2nd rotation member] becomes large, either one pair of 1st elastic members or one pair of 2nd elastic members will be stuck beyond another side.
[0026] They are one pair of plates which the 1st rotation member and the 2nd rotation member have been arranged for the damper device according to claim 18 together with radial in claim 6, and the disc-like member has been arranged at the shaft-orientations both sides of the 1st rotation member and the 2nd rotation member, and were fixed by the connection section. The 1st window hole and the 2nd window hole are formed in one pair of plates. One pair of 1st elastic members and one pair of 1st

sheets [some] are arranged in the 1st window hole, one pair of 2nd elastic members and one pair of 2nd sheets [some] are arranged in the 2nd window hole, the 1st rotation member has the 1st supporter which engages with the circumferencial direction both ends of the 1st sheet, and the 2nd rotation member has the 2nd supporter which engages with the circumferencial direction both sides of the 2nd sheet.

[0027] By the damper device according to claim 19, the 1st window hole and the 2nd window hole of each other are continuously formed together with radial in claim 18. By the damper device according to claim 20, in claims 18 or 19, one pair of 1st sheets have the 1st body with which each is prolonged in shaft orientations, the 1st body penetrates the circumferencial direction both ends of the 1st window hole, and shaft-orientations both sides are engaging with the circumferencial direction edge of one pair of 1st elastic members. One pair of 2nd sheets have the 2nd body with which each is prolonged in shaft orientations, the 2nd body penetrates the circumferencial direction both ends of the 2nd window hole, and shaft-orientations both ends are engaging with the circumferencial direction both ends of one pair of 2nd elastic members.

[0028] By the damper device according to claim 21, in claim 20, it has one pair of 1st engagement sections which the 1st sheet is prolonged from the 1st body and engage with the circumferencial direction edge of one pair of 1st elastic members, respectively, and the 2nd sheet has one pair of 2nd engagement sections which are prolonged from the 2nd body and engage with the circumferencial direction edge of one pair of 2nd elastic members, respectively. By the damper device according to claim 22, in claims 20 or 21, the 1st body is engaging with the 1st window hole and the circumferencial direction both ends of the 1st supporter possible [balking to a circumferencial direction] impossible [migration to radial], and the 2nd body is engaging with the 2nd window hole and the circumferencial direction both ends of the 2nd supporter possible [balking to a circumferencial direction] impossible [migration to radial].

[0029] By the damper device according to claim 23, it sets to either of claims 20-22. The 1st sheet It has the 1st stop section which is prolonged in the opposite side the 1st elastic member side in a circumferencial direction from the shaft-orientations pars intermedia of the 1st body, and is inserted among one pair of plates. The 2nd sheet It has the 2nd stop section inserted among one pair of plates prolonged in the opposite side the 2nd elastic member side in a circumferencial direction from the shaft-orientations pars intermedia of the 2nd body.

[0030] The damper device according to claim 24 is equipped with the 1st rotation plate, one pair of 2nd rotation plates, one pair of coil springs, and one pair of sheets. The 1st rotation and a play have the 1st window part. It is mutually fixed to the shaft-orientations both sides of the 1st window part, one pair of 2nd rotation plates are arranged, and it has the 2nd window part corresponding to the 1st window part, respectively. One pair of coil springs are arranged at the shaft-orientations both sides of the 1st window part of the 1st rotation plate, and are arranged in the 2nd window part. One pair of sheets have the body with which the circumferencial direction both ends of the 1st window part are penetrated, it extends in shaft orientations, and each shaft-orientations both ends engage with one pair of coil springs.

[0031] By this damper device, it has one pair of coil springs arranged in torque transmission at juxtaposition, and has one pair of sheets which engage with the circumferencial direction both ends of one more pair of coil springs. Here, since two coil springs are supported with one pair of sheets, components mark have decreased. The damper device according to claim 25 has one pair of insertion sections which a sheet is prolonged from a body and prolonged in one pair of coil springs in claim 24.

[0032] By this damper device, one pair of coil springs have stopped being able to secede from a sheet easily. As for the damper device according to claim 26, in claim 24 or 25, the body is engaging with the circumferencial direction both ends of the 1st window part and the 2nd window part possible [balking to a circumferencial direction] impossible [migration to radial].

[0033] By this damper device, one pair of sheets have stopped easily being able to break away to the method of the outside of radial from the 1st rotation plate and the 2nd rotation plate. For this reason, with the structure of being hard to separate especially a coil spring from a sheet, it is hard to move a

coil spring to the method of the outside of radial also from the 1st and 2nd rotation plate. As for the damper device according to claim 27, the crevice is formed in the radial pars intermedia of the circumferencial direction both ends of the 2nd window part in either of claims 24-26, and the body of a sheet is arranged in the crevice. One pair of coil springs are in contact with the radial both sides of circumferencial direction both ends.

[0034] It has the lobe by which a sheet is prolonged in the opposite side a coil spring side in a circumferencial direction from the shaft-orientations pars intermedia of a body, and a damper device according to claim 28 is sandwiched among one pair of 2nd rotation plates in either of claims 24-27. It has been hard coming to move a sheet to shaft orientations by this damper device to one pair of 2nd rotation plates. For this reason, with the structure of being hard to separate especially a coil spring from a sheet, it is hard to move a coil spring to shaft orientations from the 2nd rotation plate. That is, the structure for supporting the shaft orientations of a coil spring becomes unnecessary.

[0035]

[Embodiment of the Invention] The clutch-disc assembly 1 as 1 operation gestalt of this invention is shown in 1st operation gestalt drawing 1 and drawing 2 . The clutch-disc assembly 1 is equipment used for the clutch of a car. The flywheel (not shown) connected with the engine and the engine on the left-hand side of drawing 1 is arranged, and transmission (not shown) is arranged on the right-hand side of drawing 1 . The clutch-disc assembly 1 has the damper function for twisting with the clutch function for performing transfer and cutoff of torque, and absorbing and decreasing vibration between an engine and transmission.

[0036] O-O shown in drawing 1 is axis of rotation of the clutch-disc assembly 1. Drawing 2 and drawing 3 The shown arrow head R1 is the hand of cut of an engine and a flywheel, and R2 is the opposite direction. The clutch-disc assembly 1 mainly consists of the input member 2, the output member 3, the pars intermedia material 4, the 1st spring 5, the 2nd spring 6, the 1st sheet 7, and the 2nd sheet 8. The input member 2 is a member which consists of the friction section 11 and the 1st and 2nd plates 12 which are mentioned later, and 13 grades, and is a member for connecting with the flywheel which is not illustrated and inputting torque into the clutch-disc assembly 1. It is the member which consists of the 1st hub mentioned later and the 2nd hub 16, and 17 grades, and the output member 3 is connected with the shaft prolonged from the transmission side which is not illustrated, and is a member for outputting the torque of the clutch-disc assembly 1. The pars intermedia material 4 is a middle member arranged in order to transmit torque between the input member 2 and the output member 3. The 1st spring 5 is a member for connecting elastically the input member 2 and the pars intermedia material 4 with a circumferencial direction. The 1st damper is constituted by the 1st spring 5, the input member 2, and the pars intermedia material 4. The 2nd spring 6 is a member for connecting elastically the pars intermedia material 4 and the output member 3 with a circumferencial direction. The 2nd damper is constituted by the 2nd spring 6, the pars intermedia material 4, and the output member 3. The 1st damper and the 2nd damper are arranged so that it may act on a serial. The 1st sheet 7 is a member which connects the input member 2 and the pars intermedia material 4 so that torque may be transmitted through the 1st spring 5 while supporting the circumferencial direction both ends of the 1st spring 5. The 2nd sheet 8 is a member which connects the pars intermedia material 4 and the output member 3 so that torque may be transmitted through the 2nd spring 6 while supporting the circumferencial direction both ends of the 2nd spring 6.

[0037] The input member 2 mainly consists of the friction section 11 and the 1st and 2nd plates 12 and 13 which are one pair of plates. The friction section 11 (clutch disc) consists of two or more cushioning plates 28 and friction facing 29 fixed to the shaft-orientations both sides of the cushioning plate 28. The 1st and 2nd plates 12 and 13 are annular plates which kept a predetermined distance and have been arranged, and each other are being fixed to shaft orientations by two or more 1st pins 14. By the 1st pin 14, the 1st and 2nd plates 12 and 13 secure a predetermined clearance to shaft orientations, and really rotate.

[0038] The 1st plate 12 and the 2nd plate 13 are explained to a detail using drawing 4 . In addition, since the 1st plate 12 and the 2nd plate 13 are isomorphism-like, they give only explanation of the

2nd plate 13 here. The 2nd plate 13 mainly consists of the annular sections 31, as shown in drawing 4 . Two or more supporters 32 which project in the radial inside are formed in the annular section 31. A supporter 32 is the structure for transmitting torque to the 1st spring 5 mentioned later. The crevice 33 cut and lacked in the circumferencial direction is formed in the shaft-orientations middle of the circumferencial direction both sides of a supporter 32. the trapezoid configuration for which a crevice 33 goes to the back and to which it is alike, and it follows and radial width of face becomes narrow -- it is -- moreover -- both corners -- ** of an angle, and **** -- it is a smooth configuration. thus, the 1st page of the circumferencial direction end face of a supporter 32 follows the inner skin of 34, the crevice 33 dented in the circumferencial direction from 34 the 1st page, and the annular section 31 from the radial inside -- 35 [page / 2nd] is formed. In addition, the space between the supporters 32 which adjoin a circumferencial direction serves as the hold section 36 for holding the 1st spring 5 mentioned later. Furthermore, two or more formation of the hole 37 to insert the 1st pin 14 in the annular section 31 of the 2nd plate 13 is carried out at the circumferencial direction.

[0039] The pars intermedia material 4 is an annular or disc-like member as shown in drawing 6 . The pars intermedia material 4 is arranged between the shaft orientations of the 1st and 2nd plates 12 and 13 by the inner circumference side of the input member 2. The periphery section of the pars intermedia material 4 is close to the inner circumference side of the 1st pin 14. Next, the detailed structure of the pars intermedia material 4 is explained using drawing 6 . The circular feed hole 46 is formed in the core of the pars intermedia material 4. Furthermore, two or more elliptical holes 47 are formed in the periphery side of a feed hole 46. As for the hole 47, circumferencial direction die length has become longer than radial die length. Two or more 1st window holes 48 are formed in the periphery section of the pars intermedia material 4. The 1st window hole 48 is an arc comparatively prolonged for a long time in a circumferencial direction. The circumferencial direction both ends of the 1st window hole 48 are configurations which become narrow [radial width of face] as they go to a circumferencial direction outside. The 2nd window hole 49 is formed in the inner circumference side of the 1st window hole 48. Although it corresponds mutually and the die length of a circumferencial direction is different, the main include angle of the 1st window hole 48 and the 2nd window hole 49 is almost the same. The circumferencial direction both ends of the 2nd window hole 49 are configurations which become narrow [radial width of face] as they go to a circumferencial direction outside. Moreover, the 1st window hole 48 supports the hold section 36 of the 1st and 2nd plates 12 and 13 in shaft orientations.

[0040] Two or more lobes 50 which project in the method of the outside of radial are formed in the periphery of the pars intermedia material 4. The lobe 50 is arranged between the circumferencial directions of two or more 1st pins 14, respectively, as shown in drawing 3 . That is, the 1st pin 14 and a lobe 50 are arranged by turns in the same radius location at the circumferencial direction. The 1st spring 5 is arranged at the shaft-orientations both sides of the pars intermedia material 4. The 1st spring 5 is arranged at the shaft-orientations both sides of the 1st window hole 48 of the pars intermedia material 4, and, more specifically, is arranged in the hold section 36 of the 1st and 2nd plates 12 and 13. The 1st spring 5 is a coil spring so that clearly from drawing 2 . Moreover, the 1st spring 5 is a member with which it comes to combine two coil springs (large coil spring 5a, small coil spring 5b). Each 1st spring 5 is arranged possible [the contact or contact to the circumferencial direction end face of a supporter 32]. The supporter 32 reached 1st page 34 and, more specifically, page [2nd] large coil spring 5a of the 1st spring 5 is in contact with 35. Next, the 1st sheet 7 is explained to a detail using drawing 7 . The 1st sheet 7 is a member which is prolonged long and slender in shaft orientations and which consists of resin, for example. The 1st sheet 7 penetrates the circumferencial direction both ends of the 1st window hole 48 of the pars intermedia material 4, and shaft-orientations both ends are arranged between a supporter 32 and the 1st spring 5 in the hold section 36 of the 1st and 2nd plates 12 and 13.

[0041] The concrete component of the 1st sheet 7 is explained. The 1st sheet 7 mainly consists of bodies 60 prolonged in shaft orientations. A body 60 has short radial width of face compared with the 1st spring 5. The 1st principal plane 63 by the side of the 1st spring 5 and the 2nd principal plane 64 by the side of a supporter 32 are formed in the body 60. The seat volume edge of large coil spring 5a

of the 1st spring 5 is close to the 1st principal plane 63 possible [contact or contact]. As mentioned above, to the 1st spring 5, since radial width of face is narrow, the body 60 is in contact only with the shaft-orientations both-sides top-most-vertices part of large coil spring 5a for the body 60. As shown in drawing 9 , radial width of face is short to the 1st principal plane 63, and the 2nd principal plane 64 has become the smooth trapezoid configuration where the angle was able to be taken in the cross section. As shown in drawing 9 , a body 60 is in the condition which it has been arranged in the crevice 33 formed in the supporter 32 of the 1st and 2nd plates 12 and 13, and was stuck to the end face. The migration to radial, rotation, etc. are forbidden to the supporter 32 in this condition, and, as for the body 60 7, i.e., the 1st sheet, only the migration left to a circumferencial direction is possible. Moreover, induction is performed by the configuration to which both members have an inclination part on radial both sides, and balking and engagement to a circumferencial direction to a body 60 and a crevice 33 are smooth. Furthermore, the lobe 61 which projects at a circumferencial direction side is formed in shaft-orientations pars intermedia at the 2nd principal plane 64 side of a body 60. The lobe 61 is in contact with the circumferencial direction both ends of the 1st window hole 48 of the pars intermedia material 4, as shown in drawing 11 . The shaft-orientations both ends of a lobe 61 incline so that shaft-orientations height may become low, as they go to a circumferencial direction outside so that clearly from drawing 7 . It faces across the inclined plane 65 of a lobe 61 between the 1st and 2nd plates 12 and 13. More specifically, the lobe 61 is further inserted into the detail from the crevice 33 between the shaft orientations of the circumferencial direction edge of a supporter 32 between the shaft orientations of the part by the side of the circumferencial direction back (supporter 32 core side). Namely, as for the 1st sheet 7, migration to shaft orientations is restricted in the 1st and 2nd plates 12 and the condition of having been engaged 13 times. in addition, the thing for which the inclined plane 65 is formed in the lobe 61 -- a lobe 61 -- the 1st and 2nd plates 12 and 13 -- since -- the actuation which breaks away and engages with a circumferencial direction is guided by the inclined plane 65, and becomes smooth. The insertion section 62 which projects in a circumferencial direction is formed in the 1st principal plane 63 side of a body 60. the insertion section 62 -- the shape of a cylindrical shape with width of face wider than a body 60 -- it is -- a supporter 32 -- the 1st page is in contact with 34 the 2nd page 35. The insertion section 62 was inserted into the seat volume of large coil spring 5a, and the peripheral face is in contact with the inner skin of a seat volume. Moreover, the seat volume of small coil spring 5b is in contact with the principal plane of the insertion section 62. According to this structure, circumferencial direction both ends are engaging with the 1st sheet 7, and the 1st spring 5 has become migration impossible to radial and shaft orientations.

[0042] The radial width of face of the body 60 of the 1st sheet 7 is equivalent to the radial width of face of the 1st window hole 48 of the pars intermedia material 4. A body 60 is arranged to the circumferencial direction both ends of the 1st window hole 48, and is arranged possible [contact or contact to both ends]. As the lobe 61 formed in the body 60 more specifically shows drawing 11 , it is in contact with the circumferencial direction edge. The migration to radial, rotation, etc. are forbidden to the pars intermedia material 4 in this condition, and only migration to a circumferencial direction is possible for the 1st sheet 7. Moreover, induction is performed by the configuration to which both members have an inclination part on radial both sides, and balking and engagement to a circumferencial direction at a body 60 and a lobe 61, and the edge of the 1st window hole 48 are performed smoothly.

[0043] Since the 1st sheet 7 is always engaging with radius directional movement impossible in the neutral condition and the torsion condition at the 1st and 2nd plates 12 and 13 or the pars intermedia material 4, as for the 1st spring 5, migration to the method of the outside of radial is always restricted. Moreover, since the 1st sheet 7 is having migration restricted to shaft orientations by the 1st and 2nd plates 12 and 13, as for the 1st spring 5, migration to shaft orientations is restricted to the 1st and 2nd plates 12 and 13. For this reason, it is not necessary to prepare the member for restricting moving the 1st spring 5 to shaft orientations in the 1st and 2nd plates 12 and 13. The configuration of the 1st and 2nd plates 12 and 13 becomes easy the above result. Moreover, the 1st spring 5 can enlarge a pitch diameter. One half or more than it is sticking out to shaft orientations to the 1st and

2nd plates 12 and 13, also in the plane view of drawing 2 , the whole is exposed and the 1st spring 5 appears.

[0044] The 1st sheet 7 makes one pair of 1st springs 5 engaged to the 1st and 2nd plates 12 and 13, if the function of the 1st sheet 7 described above is summarized while performing torque transmission in support of the circumferencial direction both ends of the 1st two springs 5 arranged at shaft orientations. The output member 3 mainly consists of one pair of 1st hubs 16 and the 2nd hub 17 which have been arranged together with shaft orientations. Both the hubs 16 and 17 have the flange 20 prolonged in radial from the tubed boss 18 and a boss 18 disc-like. From the flange 20, two or more supporters 21 further prolonged in the method of the outside of radial are formed. A supporter 21 is the structure for supporting the circumferencial direction both ends of the 2nd spring 6 mentioned later. The supporter 21 has a sector in which circumferencial direction width of face spreads toward the method of the outside of radial. The crevice 41 of the configuration cut and lacked is formed in the radial pars intermedia of the circumferencial direction end face of a supporter 21. a crevice 41 -- on the way -- since -- the trapezoid configuration which goes to the back and to which it is alike, and it follows and radial width of face becomes narrow -- it is -- moreover -- both corners -- ** of an angle, and **** -- it is a smooth configuration. consequently, the circumferencial direction end face of a supporter 21 -- the periphery side from an inner circumference side -- turning -- the 1st -- page 42 and a crevice 41 -- 43 [page / 2nd] is formed. It is the hold section 44 for holding the 2nd spring 6 mentioned later between the supporters 21 which adjoin a circumferencial direction. The hold section 44 supports the 2nd window hole 49 of the pars intermedia material 4. The 1st hub 16 and the 2nd hub 17 are being mutually fixed to the circumferencial direction by the 2nd pin 15 by which two or more arrangement was carried out. Consequently, the 1st hub 16 and the 2nd hub 17 secure a predetermined clearance to shaft orientations, and really rotate it. Two or more holes 45 with which the 2nd pin is fixed are formed in the flange 20 of the 1st and 2nd hubs 16 and 17. The 2nd pin 15 inserts in the inside of the hole 47 of the pars intermedia material 4, and only its predetermined include angle is movable to a circumferencial direction within a hole 47.

[0045] The location of the flange 20 of the 1st hub 16 in the 1st plate 12 and shaft orientations corresponds, and the location of the flange 20 of the 2nd hub 17 in the 2nd plate 13 and shaft orientations corresponds. The respectively annular washer 26 is in contact with the inner circumference section both-sides side of the pars intermedia material 4. Between a washer 26 and the flange 20 of the 1st hub 16, and between the washer 26 of another side, and the flange 20, the spring 27 (wave spring) is arranged, respectively. A spring 27 is arranged in the condition of having been compressed into shaft orientations, and is energizing the washer 26 to the pars intermedia material 4 side. In addition, the washer 26 is arranged movable to the 2nd pin 15 only at shaft orientations. That is, a washer 26 the 1st hub 16 and the 2nd hub 17, and really rotates.

[0046] Positioning of the shaft orientations of the output member 3 and the pars intermedia material 4 is performed by the configuration of a washer 26 and a spring 27, and when the pars intermedia material 4, the 1st hub 16, and the 2nd hub 17 carry out relative rotation, frictional resistance (hysteria SHISUTE torque) occurs between the pars intermedia material 4 and a washer 26. Between the 2nd pin 15 and the circumferencial direction edge of a hole 47, it is the 1st torsion include angle theta 1 to circumferencial direction one side. The clearance is secured. Moreover, between the lobe 50 of the pars intermedia material 4, and the 1st pin 14, it is the 2nd torsion include angle theta 2. The clearance is established in the circumferencial direction, respectively. The 2nd torsion include angle theta 2 theta 1 It is large. That is, the 1st pin 14 and a hole 47 are functioning as a relative rotation stopper between the output member 3 and the pars intermedia material 4, and a lobe 50 and the 1st pin 14 are functioning as a relative rotation stopper between the input member 2 and the pars intermedia material 4.

[0047] The 2nd spring 6 is arranged at the shaft-orientations both sides of the pars intermedia material 4. The 2nd spring 6 is arranged at the shaft-orientations both sides of the 2nd window hole 49 of the pars intermedia material 4, and, more specifically, is arranged in the hold section 44 of the flange 20 of the 1st and 2nd hubs 16 and 17. The 2nd spring 6 is a coil spring so that clearly from drawing 2 . Although circumferencial direction die length is short compared with the 1st spring 5, the

compressible torsion include angle of the 2nd spring 6 is almost equal. Moreover, although the 2nd spring 6 of a wire size is large to large coil spring 5a, to the 1st spring 5, the spring constant has become almost equal [one to one or the whole]. Each 2nd spring 6 is arranged possible [the contact or contact to the circumferencial direction end face of a supporter 21]. The seat volume of the 2nd spring 6 reached 1st page 42, and, more specifically, is in contact with 43 the 2nd page.

[0048] Next, the 2nd sheet 8 is explained to a detail using drawing 8 . The 2nd sheet 8 is a member which is prolonged long and slender in shaft orientations and which consists of resin, for example. The 2nd sheet 8 penetrates the circumferencial direction both ends of the 2nd window hole 49 of the pars intermedia material 4, and shaft-orientations both ends are arranged between a supporter 21 and the 2nd spring 6 in the hold section 44 of the 1st and 2nd hubs 16 and 17.

[0049] The concrete component of the 2nd sheet 8 is explained. The 2nd sheet 8 mainly consists of bodies 52 prolonged in shaft orientations. A body 52 has short radial width of face to the 2nd spring 6. The 1st principal plane 56 by the side of the 2nd spring 6 and the 2nd principal plane 57 by the side of a supporter 21 are formed in the body 52. The seat volume edge of the 2nd spring 6 is close to the 1st principal plane 56 possible [contact or contact]. As mentioned above, to the 2nd spring 6, since radial width of face is narrow, the body 52 is in contact only with the shaft-orientations both-sides top-most-vertices part of the 2nd spring 6 for the body 52. As shown in drawing 10 , width of face is short to the 1st principal plane 56, and the 2nd principal plane 57 has become the smooth trapezoid or the Yamagata configuration where the angle was able to be taken in the cross section. As shown in drawing 10 , a body 52 is in the condition which it has been arranged in the crevice 41 formed in the supporter 21 of the 1st and 2nd hubs 16 and 17, and was stuck to the end face. The migration to radial, rotation, etc. are forbidden to the supporter 21 in this condition, and, as for the body 52 8, i.e., the 2nd sheet, only the migration left to a circumferencial direction is possible. Moreover, induction is performed on radial both sides of both members by the configuration which has an inclination part, and balking and engagement to a circumferencial direction to the 2nd sheet 8 and a crevice 41 are smooth. Furthermore, the lobe 53 which projects at a circumferencial direction side is formed in shaft-orientations pars intermedia at the 2nd principal plane 57 side of a body 52. The lobe 53 is in contact with the circumferencial direction both ends of the 2nd window hole 49 of the pars intermedia material 4, as shown in drawing 11 . The shaft-orientations both ends of a lobe 53 incline so that shaft-orientations height may become low, as they go to a circumferencial direction outside so that clearly from drawing 8 . It faces across the inclined plane 58 of a lobe 53 between the 1st and 2nd hubs 16 and 17. A lobe 53 is inserted between the shaft orientations of the circumferencial direction both ends of a supporter 21, and, more specifically, is further inserted into the detail from the crevice 41 in the supporter 21 between the parts by the side of the circumferencial direction back (supporter 32 core side). That is, after the 2nd sheet 8 has engaged with the 1st and 2nd hubs 16 and 17, migration to shaft orientations is restricted. The insertion section 54 which projects in a circumferencial direction is formed in the 1st principal plane 56 side of a body 52. The insertion section 54 is a cylindrical shape, it was inserted into the seat volume of the 2nd spring 6, and the peripheral face is in contact with the inner skin of a seat volume. According to this structure, circumferencial direction both ends are engaging with the 2nd sheet 8, and the 2nd spring 6 has become migration impossible to radial and shaft orientations.

[0050] The radial width of face of the body 52 of the 2nd sheet 8 is equivalent to the radial width of face of the 2nd window hole 49 of the pars intermedia material 4. A body 52 is arranged to the circumferencial direction both ends of the 2nd window hole 49, and is arranged possible [contact or contact to both ends]. As the lobe 53 formed in the body 52 more specifically shows drawing 11 , it is in contact with the circumferencial direction edge. The migration to radial, rotation, etc. are forbidden to the ****** member 4 in this condition, and only migration to a circumferencial direction is possible for the 2nd sheet 8. Moreover, balking and engagement to a circumferencial direction at a body 52 and a lobe 53, and the edge of the 2nd window hole 49 are guided to both sides with the configuration which has an inclination part, and are smoothly performed on them.

[0051] Furthermore, since the 2nd sheet 8 is always engaging with radius directional movement impossible in the neutral condition and the torsion condition at the 1st and 2nd hubs 16 and 17 or the

pars intermedia material 4, as for the 2nd spring 6, migration to the method of the outside of radial is always restricted. Moreover, since the 2nd sheet 8 is having migration restricted to shaft orientations by the 1st and 2nd hubs 16 and 17, as for the 2nd spring 6, migration to shaft orientations is restricted to the 1st and 2nd hubs 16 and 17. For this reason, it is not necessary to prepare the member for restricting moving the 2nd spring 6 to shaft orientations in the 1st and 2nd hubs 16 and 17. As for the flange 20 of the 2nd hub 16 and 17, a configuration becomes easy the above result. Moreover, the 2nd spring 6 can enlarge a pitch diameter. One half or more than it is sticking out to shaft orientations to the flange 20, also in the plane view of drawing 2 , the whole is exposed and the 2nd spring 6 appears.

[0052] If the function of the 2nd sheet 8 described above is summarized, while performing torque transmission in support of the circumferencial direction both ends of the 2nd two springs 6 arranged at shaft orientations, one pair of 2nd springs 6 are made engaged to the 1st and 2nd hubs 16 and 17. One pair of 1st springs 5 are arranged on both sides of the pars intermedia material 4 the above result at shaft orientations in each location. There was the 1st spring 5 along the 1st window hole 48 of the pars intermedia material 4, it was prolonged, and, more specifically, is in contact with the radial both sides of the 1st window hole 48. As mentioned above, one pair of 1st springs 5 are positioned by shaft orientations to the 1st and 2nd plates 12 and 13 through the 1st sheet 7, it is that one pair of the 1st springs 5 sandwich pars intermedia material in between, and shaft-orientations positioning with the 1st and 2nd plates 12 and 13 and the pars intermedia material 4 is carried out. One pair of 2nd springs 6 are arranged on both sides of the pars intermedia material 4 at the inner circumference side of each 1st spring 5 at shaft orientations. There was the 2nd spring 6 along the 2nd window hole 49 of the pars intermedia material 4, it was prolonged, and, more specifically, is in contact with the radial both sides of the 2nd window hole 49. As mentioned above, one pair of 2nd springs 6 are positioned by shaft orientations to the 1st and 2nd hubs 16 and 17 through the 2nd sheet 8, it is that one pair of the 2nd springs 6 sandwich the pars intermedia material 4 in between, and shaft-orientations positioning with the 1st and 2nd hubs 16 and 17 and the pars intermedia material 4 is carried out.

[0053] Furthermore, one pair of 1st springs 5 and one pair of 2nd springs 6 approach radial, do not arrange other members etc. in between, but are close. namely, the inside of the tooth space where the 1st spring 5 and the 2nd spring 6 were restricted in shaft orientations and radial -- the maximum -- it is arranged densely. the above structure -- another viewpoint -- since -- if it explains, the 1st sheet 7 of 5 or 1 pair of 1st spring of 2 or 1 pair of input member and the pars intermedia material 4 constitute the 1st damper, and the pars intermedia material 4, the 2nd sheet 8 of one pair of 2nd springs [6 or 1 pair of], and the output member 3 constitute the 2nd damper. Each damper consists of the 1st rotation plate (pars intermedia material 4), one pair of 2nd rotation plates (plates 12 and 13 or one pair of flanges 20), one pair of coil springs (the 1st spring 5 or the 2nd spring 6), and one pair of sheets (the 1st sheet 7 or the 2nd sheet 8). The 1st rotation plate has the 1st window part (window hole). It is mutually fixed to the shaft-orientations both sides of the 1st window part, one pair of 2nd rotation plates are arranged, and it has the 2nd window part (hold section) corresponding to the 1st window part, respectively. One pair of coil springs are arranged at the shaft-orientations both sides of the 1st window part of the 1st rotation plate, and are arranged in the 2nd window part. One pair of sheets have the body with which the circumferencial direction both ends of the 1st window part are penetrated, it extends in shaft orientations, and each shaft-orientations both ends engage with one pair of coil springs.

[0054] By this damper device, it has one pair of coil springs arranged in torque transmission at juxtaposition, and has one pair of sheets which engage with the circumferencial direction both ends of one more pair of coil springs. Here, since two coil springs are supported with one pair of sheets, components mark have decreased. The damper device described above may use only one as other applications, although two are arranged in this example at the serial. In that case, the 1st rotation plate becomes the flange of a hub and one pair of 2nd rotation plates turn into the conventional input-side plate. Or it becomes the reverse.

[0055] The machine circuit diagram about the damper device of the clutch-disc assembly 1 applied to

this invention at drawing 14 is shown. This machine circuit diagram is drawing for explaining the relation of the member when operating to the one direction of the circumferencial direction of a damper device. The 1st spring 5 makes one unit one pair of springs located in a line with shaft orientations, and the 2nd spring 6 makes one unit one pair of springs located in a line with shaft orientations.

[0056] Torque-transmission actuation of the clutch-disc assembly 1 is explained. Torque will be inputted into the clutch-disc assembly 1 if pushed against the flywheel which the friction section 11 of the input member 2 does not illustrate. Torque is transmitted from the 1st and 2nd plates 12 and 13 in order of the 1st and 2nd hubs 16 and 17 of the 1st spring 5, the 1st sheet 7, the pars intermedia material 4, the 2nd spring 6, the 2nd sheet 8, and the output member 3. From the output member 3, torque is outputted to the shaft which is prolonged from the transmission which is not illustrated and which is not illustrated.

[0057] If the torque fluctuation from an engine is inputted into the clutch-disc assembly 1, it will twist between the input member 2 and the output member 3, vibration, i.e., relative rotation, will arise, and two or more pairs of 1st springs 5 and two or more pairs of 2nd springs 6 will be compressed into a serial. Actuation of the clutch-disc assembly 1 when torsion vibration occurs is explained. Here, the friction section 11 of the input member 2 is fixed to other members, and it explains as actuation which twists statically the 1st and 2nd hubs 16 and 17 of the output member 3 to an one direction to it.

[0058] Three is twisted to the output memberR1 side. Then, 21 pushes six on the 2nd springR1 side with the 2nd sheet 8 by the side of the supporterR2 of the 1st and 2nd hubs 16 and 17. The 2nd sheet 8 by the side of R2 separates from 49R2nd window hole 2 side edge of the pars intermedia material 4 to R1 side. Moreover, the supporter 21 which was engaging with the 2nd sheet 8 by the side of R1 is separated from the 2nd sheet 8 to R1 side. Consequently, the 2nd spring 6 is compressed through the 2nd sheet 8 of both sides between the 1st and 2nd hubs 16 and 17 and the pars intermedia material 4.

[0059] Six R2nd spring 2 side edge is having migration of radial and shaft orientations regulated by the 1st and 2nd hubs 16 and 17 through the 2nd sheet 8 by the side of R2, and six R2nd spring 1 side edge is having radial migration regulated by the pars intermedia material 4 through the 2nd sheet 8 by the side of R1 in the above actuation. Moreover, since one pair of 2nd springs 6 have sandwiched the pars intermedia material 4 between shaft orientations, it is hard to move them to shaft orientations.

[0060] On the other hand, four moves to the pars intermedia materialR1 side energized at R1 side, and pushes seven on the 1st sheetR1 side by the side of R2. The 1st sheet 7 by the side of R2 pushes five on the 1st springR1 side, separating from the 1st and 2nd plates 12 and the supporter 32 by the side ofR2 [13] to R1 side. The five 1st springR1 side is supported with the supporter 32 of the 1st and 2nd plates 12 and 13, and the 2nd sheet 8 by the side of R1. For this reason, the 1st spring 5 is compressed through the 1st sheet 7 of both sides between the pars intermedia material 4 and the 1st and 2nd plates 12 and 13.

[0061] Five R1st spring 2 side edge is having radial migration regulated by the pars intermedia material 4 through the 1st sheet 7 by the side of R2, and five R1st spring 1 side edge is having migration of radial and shaft orientations regulated by the 1st and 2nd plates 12 and 13 through the 1st sheet 7 by the side of R1 in the above actuation. Moreover, since one pair of 1st springs 5 have sandwiched the pars intermedia material 4 between shaft orientations, it is hard to move them to shaft orientations.

[0062] When twisting three to the output memberR2 side, R1 and R2 interchange by the above explanation. By compressing the 1st spring 5 and the 2nd spring 6 into a serial, as shown in the torsion characteristic ray Fig. shown in drawing 13 , it is a spring constant K1 in the field where a torsion include angle is small. The property of low rigidity is acquired. A torsion include angle is theta 1. If it becomes, the 2nd pin 15 and a hole 47 will contact a circumferencial direction. Consequently, relative rotation with the pars intermedia material 4 and the output member 3 stops, and, as a result, compression of the 2nd spring 6 is suspended. Consequently, theta 1 Only the 1st spring 5 is compressed the above include angle, and it is a spring constant K2. The property of high rigidity is acquired. A torsion include angle is theta 2. If it becomes, the 2nd pin 14 will contact a

lobe 50 and the relative rotation between the input member 2 and the output member 3 will stop.
[0063] In this property, while low rigidity and the property of high rigidity are acquired by the 1st step in the 2nd step and acquiring the property of low rigidity for a torsion include angle large moreover, stopper torque big enough can be acquired.
In the pars intermedia material 4 shown in [modification] drawing 15 and drawing 16 , 2 ****s of the 1st window hole 48 are made into the circumferencial direction, and it has the stop side 74 in the 1st sheet 7 and the opposite side, respectively. It is the 2nd torsion include angle theta 2 between the 1st principal plane 63 of the 1st sheet 7, and the stop side 74 of the pars intermedia material 4. It is secured. Moreover, 2 ****s of the 2nd window hole 49 are made into the circumferencial direction, and the stop side 71 is formed in the opposite side where the 2nd sheet 8 has been arranged, respectively. Between the stop side 71 and the 1st principal plane 56 of the 2nd sheet 8, it is the 1st torsion include angle theta 1. It is secured. Include angle theta 1 theta 2 Relation is the same as that of said operation gestalt. With this configuration, as shown in drawing 16 , the relative rotation stopper of the input member 2 and the pars intermedia material 4 is formed of the 1st sheet 7 and the stop side 74, and the relative rotation stopper between the output member 3 and the pars intermedia material 4 is formed of the 2nd sheet 8 and the stop side 71. Since each sheet is used as a stopper configuration member with this operation gestalt, structure is easy.
[0064] Furthermore, a two-step property can be realized using adhesion of a spring, without using a special stopper device, as shown in drawing 17 . For example, after the configuration which adhesion of the 2nd spring 6 produces before adhesion of the 1st spring 5, then the 2nd spring 6 stick, the property of high rigidity is acquired. About each stopper device described above, a class may be changed with the 1st step in the 2nd step, respectively.
[0065] Moreover, although the spring constant of the 1st spring 5 and the 2nd spring 6 was mostly made into the equal with the above-mentioned operation gestalt, you may make it differ. For example, when the thing of low rigidity is used compared with the 1st spring 5, adhesion of the 2nd spring 6 is prevented according to the 1st step of stopper device, and breakage of the 2nd spring 6 etc. cannot produce the 2nd spring 6 easily. The 1st torsion include angle theta 1 The 2nd torsion include angle theta 2 You may enlarge.
[0066] Furthermore, a stopper may be set only to one and you may make it one step of torsion property. Furthermore, the 1st step of torsion include angle theta 1 Although [forward side] it is the same at a negative side, you may make it differ. The 2nd step of torsion include angle theta 2 Although [forward side] it is the same at a negative side, you may make it differ.
The clutch-disc assembly 101 as the 2nd operation gestalt of this invention is shown in 2nd operation gestalt drawing 18 - drawing 20 . The clutch-disc assembly 101 mainly consists of the input member 102, the output member 103, the pars intermedia material 104, the 1st spring 105, the 2nd spring 106, the 1st sheet 107, and the 2nd sheet 108. Each part material corresponds in machine circuit with the 1st operation gestalt and the 2nd operation gestalt.
[0067] The input member 102 consists of the friction section 111 (clutch disc) and an annular input plate 130. The cushioning plate edge of the friction section 111 is being fixed to the periphery edge of a plate 130. Two or more window holes 136 which extend for a long time are formed in the circumferencial direction at the inner circumference side of a plate 130. The output member 103 consists of a boss 118 and a flange 120 prolonged in radial from a boss 118. The location in shaft orientations of a flange 120 is almost the same as that of a plate 130, and it is arranged at the inner circumference side of a plate 130. In addition, the inner circumference edge of a plate 130 and the periphery edge of a flange 120 are circular, and few clearances were set and it has stood in a line.
[0068] Two or more window holes 144 located in a line with the circumferencial direction are formed in the periphery side at the flange 120. The window hole 144 has extended for a long time in the circumferencial direction. The window hole 144 is formed corresponding to the window hole 136. The pars intermedia material 104 consists of one pair of disc-like or annular plates 112,113. The inner circumference edge is close to the boss 118 periphery edge of the output member 103, and the periphery edge of a plate 112,113 corresponds with the periphery edge of a plate 130 mostly. A plate 112,113 opens a clearance in a plate 130 and the shaft-orientations both sides of a flange 120, and is

arranged. The plate 112 and the plate 113 of each other are being fixed to the inner circumference side by two or more pins 115. A plate 112 and a plate 113 set predetermined spacing to shaft orientations, are held by connection by this pin 115, and really rotate by it.

[0069] Next, the window hole of a plate 112,113 is explained to a detail. In addition, since a plate 112 and a plate 113 are the same configurations here, only explanation of a plate 113 is given. Two or more 1st window holes 148 which extend for a long time are formed in the circumferencial direction at the periphery side of a plate 113. The 1st window hole 148 is space in which a part of 1st spring 105 and 1st sheet 107 are held. The 1st window hole 148 is equivalent to the window hole 136 of a plate 130. The 2nd window hole 149 is formed in the inner circumference side of the 1st window hole 148. As for the 2nd window hole 149, compared with the 1st window hole 148, circumferencial direction die length is short. The 2nd window hole 149 is space where a part of 2nd spring 106 and 2nd sheet 108 are arranged. The 1st window hole 148 and the 2nd window hole 149 are continuing, namely, in the same window hole, the 1st spring 105 and the 2nd spring 106 approach radial, and each other are arranged. Thus, because each spring 105,106 is made to engage with balking impossible from a plate 112,113 through the 1st and 2nd sheets 107,108 at them, it can approach radial in two kinds of serial arrangement springs.

[0070] The 1st sheet 107 is equivalent to the 1st sheet 7 in the 1st operation gestalt, and is supporting the circumferencial direction both ends of the 1st spring 105. The relation in which the 1st sheet 107 engages with a plate 112,113 is equivalent to the relation in which the 1st sheet 7 engages with plates 12 and 13 in the 1st operation gestalt. Moreover, the relation in which the 1st sheet 107 engages with a plate 130 is equivalent to the relation in which the 1st sheet 7 engages with the pars intermedia material 4 in the 1st operation gestalt.

[0071] The 2nd sheet 108 is equivalent to the 2nd sheet 108 in the 1st operation gestalt, and is supporting the circumferencial direction both ends of the 2nd spring 106. The relation in which the 2nd sheet 108 engages with a flange 120 is equivalent to the relation in which the 2nd sheet 8 engages with the pars intermedia material 4 in the 1st operation gestalt. The relation in which the 2nd sheet 108 engages with a plate 112,113 is equivalent to the relation in which the 2nd sheet 8 engages with a flange 20 in the 1st operation gestalt.

[0072] The same outstanding effectiveness as said operation gestalt is acquired also with this operation gestalt. An extract of the common feature of the structure of an example 1 and an example 2 constitutes the damper device from the 1st body of revolution (2,102), the 2nd body of revolution (4,104), the 3rd body of revolution (3,103), one pair of 1st elastic members (5,105), and one pair of 2nd elastic members (6,106). The 2nd body of revolution (4,104) is arranged near the 1st body of revolution (2,102). The 3rd body of revolution (3,103) is arranged near the 2nd body of revolution. One pair of 1st elastic members (5,105) are arranged together with shaft orientations, and if the 1st body of revolution (2,102) and the 2nd body of revolution (4,104) carry out relative rotation, they are arranged so that it may be compressed into a circumferencial direction by juxtaposition among both body of revolution. It is arranged together with one pair of 2nd elastic members (6,106), and shaft orientations, if the 3rd body of revolution carries out relative rotation, it will be arranged so that it may be compressed into a circumferencial direction by juxtaposition among both body of revolution, and it is arranged in the location where radial differs to one pair of 1st elastic members (5,105).

[0073] By this damper device, one pair of 2nd elastic members (6,106) arranged at juxtaposition in one pair of 1st elastic members (5,105) and torque transmission which have been arranged in torque transmission at juxtaposition are arranged through the 2nd body of revolution (4,104) at the serial between the 1st body of revolution (2,102) and the 3rd body of revolution (3,103) in between. A big torque capacity is obtained with a large torsion include angle according to this structure.

[0074] This invention is not limited to a clutch-disc assembly, but can be adopted as other damper devices.

[0075]

[Effect of the Invention] By the damper device concerning this invention, one pair of 2nd elastic members arranged at juxtaposition in one pair of 1st elastic members and torque transmission which have been arranged in torque transmission at juxtaposition are arranged between the 1st body of

revolution and the 3rd body of revolution through the 2nd body of revolution at the serial in between. A big torque capacity is obtained with a large torsion include angle according to this structure.

[Translation done.]

DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] The clutch-disc assembly as the 1st operation gestalt of this invention.
[Drawing 2] It is II view Fig. of drawing 1 , and is the top view of a clutch-disc assembly.
[Drawing 3] The top view of the clutch-disc assembly which removed each part gradually.
[Drawing 4] The top view of a plate.
[Drawing 5] The top view of a hub.
[Drawing 6] The top view of pars intermedia material.
[Drawing 7] The partial cross section which shows the configuration of the 1st spring and the 1st sheet.
[Drawing 8] the part which shows the structure of the 2nd spring and the 2nd sheet -- a sectional view.
[Drawing 9] The partial enlarged drawing of drawing 3 .
[Drawing 10] The partial enlarged drawing of drawing 3 .
[Drawing 11] The partial enlarged drawing of drawing 3 .
[Drawing 12] The part plan showing the relation between pars intermedia material and a stop pin.
[Drawing 13] The torsion characteristic ray Fig. of the clutch-disc assembly in the 1st operation gestalt.
[Drawing 14] The machine circuit diagram of the clutch-disc assembly in the 1st operation gestalt.
[Drawing 15] a modification -- the part plan showing the spring stopper device to kick.
[Drawing 16] The machine circuit diagram of the clutch-disc assembly in a modification.
[Drawing 17] The machine circuit diagram of the clutch-disc assembly in a modification.
[Drawing 18] The longitudinal-section schematic diagram of the clutch-disc assembly in the 2nd operation gestalt.
[Drawing 19] XIX of drawing 18 It is a view Fig. and is the top view of a clutch-disc assembly.
[Drawing 20] The part plan of the clutch-disc assembly which removed components gradually.
[Description of Notations]
1 Clutch-Disc Assembly (Damper Device)
2 Input Member
3 Output Member
4 Pars Intermedia Material
5 1st Spring
6 2nd Spring
7 1st Sheet
8 2nd Sheet
11 Friction Section
12 1st Plate
13 2nd Plate
14 1st Pin
15 2nd Pin
16 1st Hub

17 2nd Hub
18 Boss
20 Flange

[Translation done.]